

Claims

what is claimed is:

- 5 1. A semiconductor device comprising:
- (a) a pattern of conductive lines within a layer of the semiconductor device, wherein the conductive lines have a defined line width;
- (b) dielectric surrounding the pattern of conductive lines in the layer; and
- 10 (c) a plurality of columnar gaps in the dielectric, which columnar gaps have an average feature dimension that is not greater than about 0.4 times the defined line width.
2. The semiconductor device of claim 1, wherein the layer of the semiconductor device is a metalization layer.
- 15 3. The semiconductor device of claim 1, wherein the conductive lines comprise copper.
4. The semiconductor device of claim 1, wherein the dielectric comprises a material selected from the group consisting of silicon oxide, silicon oxycarbide, fluorinated silicate glass, silicon nitride, spin-on organic materials, spin-on inorganic materials, and spin-on inorganic-hybrid materials.
- 20 5. The semiconductor device of claim 1, further comprising a layer deposited over the columnar gaps to enclose said gaps within the semiconductor device.
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